

CLAIMS

We claim:

1. A display apparatus for optimizing a displayed image for use in an electronic device comprising:
 - a display for presenting a visual image;
 - a processor for determining an intensity of a backlight for illuminating the display; and
 - a controller coupled to the display and the processor, wherein the controller optimizes the visual image corresponding to an intensity of the backlight.
2. The display apparatus of claim 1 wherein the display further comprises a pixel array, wherein the visual image is optimized by adjusting a level of one of a red, a green and a blue setting for a pixel of the pixel array.
3. The display apparatus of claim 2 wherein a hue of the pixel of the pixel array is retained when the visual image is optimized.
4. The display apparatus of claim 3 wherein the saturation of the pixel of the pixel array is retained when the visual image is optimized.
5. The display apparatus of claim 2 wherein the level of the one of the red, the green and the blue settings is adjusted inversely proportionally to the intensity of the backlight.
6. The display apparatus of claim 2 wherein the level of the one of the red, green and blue settings is adjusted inversely proportionally to the intensity of the backlight until a one of the settings would exceed a limit value, wherein the one of the settings is set to a maximum value and an adjustment proportional to a change of the one of the settings is used for a remaining setting.

7. The display apparatus of claim 2 wherein the level of the one of the red, green and blue settings is adjusted inversely proportionally to the intensity of the backlight until a one of the settings would exceed a limit value, wherein the intensity of the backlight is adjusted until the one of the settings is approximately at the limit value.
8. The display apparatus of claim 2 wherein the pixel of the pixel array is adjusted in accordance with the intensity of the backlight at the pixel.
9. The display apparatus of claim 1 wherein the electronic device is one of a wireless communication device and personal digital assistant.
10. The display apparatus of claim 1 wherein the controller optimizes the visual image based on the intensity of the backlight according to one of a fixed value look up and a real-time calculation.
11. The display apparatus of claim 1 wherein the controller optimizes the visual image corresponding to the intensity of the backlight in real time with respect to an incoming image.
12. The display apparatus of claim 1 wherein the controller optimizes the visual image corresponding to the intensity of the backlight in a buffer memory.
13. A method for optimizing an image in a display of an electronic device responsive to a change in an intensity of a backlight comprising:
 - determining a factor for adjusting the image according to the intensity of the backlight; and
 - adjusting the image using the factor.
14. The method of claim 13 wherein the determining the factor further comprises:

determining a constant value for scaling a brightness of a pixel in the display.

15. The method of claim 13 wherein the determining a factor further comprises:

determining a value for scaling a brightness of a pixel in the display to maintain a hue of the pixel.

16. The display apparatus of claim 13 wherein the determining a factor further comprises:

determining a constant value for scaling a brightness of a pixel to maintain a saturation of the pixel.

17. The method of claim 13 wherein the determining a factor further comprises:

determining a magnitude of one of a red, a green and a blue setting for a pixel in the display inversely proportionally to a change in the intensity of the backlight.

18. The method of claim 13 wherein the determining the factor further comprises:

determining the magnitude of a one of a red, a green and a blue setting for a pixel in the display inversely proportionally to the change in the intensity of the backlight unless the magnitude of the one exceeds a limit wherein the magnitude of the one is set to a maximum and a factor proportional to the one is determined for a remaining setting.

19. The method of claim 13 wherein the determining the factor further comprises one of:

determining the factor according to a table look up; and

determining the factor according to a calculation using a value corresponding to the intensity of the backlight.

20. The method of claim 13 wherein the optimizing the image further comprises:
- adjusting the image in a portion of the display according to the intensity of the backlight in the portion.
21. A display controller for providing an image optimized to a backlight intensity comprising:
- a first input for receiving a first data to display as the image;
 - a second input corresponding to a backlight intensity of a display having a pixel;
 - an output for driving the pixel of the display; and
 - a processor for adjusting a brightness of the pixel responsive to one of the first and second input.
22. The display controller of claim 21 wherein the second input is one of an indication of backlight intensity and a second data for use in adjusting the backlight intensity.
23. The display controller of claim 21 wherein the processor adjusts a value for a one of the red, the green and the blue settings for the pixel to adjust the brightness of the pixel in inverse proportion to the backlight intensity.
24. The display controller of claim 21 wherein the processor adjusts the value for the one of the red, the green and the blue settings for the pixel to maintain a hue of the pixel.
25. The display controller of claim 21 wherein the processor adjusts a value for one of the red, the green, and the blue settings for the pixel to maintain a saturation of the pixel.
26. The display controller of claim 21 wherein the processor adjusts the value for the one of the red, the green and the blue settings for the pixel

inversely proportionally to the backlight intensity until a one of the settings would exceed a limit value, wherein the one of the settings is set to a maximum value and an other setting is increased by the percentage increase of the one.

27. The display controller of claim 21 wherein a portion of the display is adjusted corresponding to the intensity of the backlight intensity in that portion of the display.

28. The display controller of claim 21 wherein the processor optimizes the visual image based on the backlight intensity according to one of a fixed value look up and a real-time calculation.

29. A display apparatus for optimizing a displayed image for use in an electronic device comprising:

- a display for presenting a visual image;
- a controller coupled to the display for rendering and storing visual images;
- a processor coupled to the controller wherein the processor controls an intensity of a backlight, the backlight for illuminating the display, the processor further retrieves images from the controller, creates an optimized rendered visual image corresponding to the intensity of the backlight and returns the optimized rendered visual image to the controller for display.

30. The display apparatus of claim 29 wherein the display further comprises a pixel array, wherein the visual image is optimized by adjusting a level of one of a red, a green and a blue setting for a pixel of the pixel array.

31. The display apparatus of claim 30 wherein one of a hue and a saturation of the pixel of the pixel array is retained when the visual image is optimized.

32. The display apparatus of claim 30 wherein the level of the one of the red, the green and the blue settings is adjusted inversely proportionally to the intensity of the backlight.

33. The display apparatus of claim 30 wherein the level of the one of the red, green and blue settings is adjusted inversely proportionally to the intensity of the backlight until a one of the settings would exceed a limit value, wherein the one of the settings is set to a maximum value and an other setting is increased by an amount proportional to the increase of the one.

34. The display apparatus of claim 30 wherein the level of the one of the red, green and blue settings is adjusted inversely proportionally to the intensity of the backlight until a one of the settings would exceed a limit value, wherein the intensity of the backlight is adjusted until the one of the settings is approximately at the limit value.

35. The display apparatus of claim 30 wherein the pixel of the pixel array is adjusted in accordance with the intensity of the backlight at the pixel.

36. The display apparatus of claim 30 wherein the electronic device is one of a wireless communication device and personal digital assistant.

37. The display apparatus of claim 29 wherein the controller optimizes the visual image based on the intensity of the backlight according to one of a fixed value look up and a real-time calculation.

38. The display apparatus of claim 29 wherein the controller optimizes the visual image corresponding to the intensity of the backlight in real time with respect to an incoming image.